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Do downward private transfers enhance maternal labor supply ? Evidence from around Europe [#]

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Abstract: Using data on 2317 mother-daughter pairs from 10 European countries, we investigate the impact of downward time and monetary transfers on the career choices of transfer-receiving young mothers. For Europe as a whole, we find a strong positive effect of grandchild care on the labor force participation and the degree of labor market involvement of the young mother, but no impact of monetary transfers on either of these decisions. Both recipients and donors with better endowments are more likely to participate in a monetary transaction, while mothers with lower level of human capital are more likely to provide time transfers to their better endowed daughters.

JEL Classification: D64, J13, J22

Keywords: grandchild care, labor participation, financial transfers

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1. Introduction

During the past several decades, decreasing fertility rates and rising life expectancy turned the attention of economists towards several major implications of population ageing around the world. On the one hand, researchers have forecasted the impact of a shrinking labor force on economic growth and the fiscal sustainability of the pay-as-you-go pension system. They have proposed an increase in retirement age and phasing out of the public pension premium over time as solution to the economic challenges (Börsch-Supan, 2001, Beetsma et alii, 2003). In an alternative, but related analytical framework, economists have explored the impact of the rising demand for informal elderly care on the labor supply of the care provider. This impact was typically found to be significant and negative (Boaz and Muller, 1992, Ettner, 1995, 1996).

Despite the stylized negative impacts of female labor market participation on fertility and of institutional inflexibility on the balancing of motherhood and career[1], significantly less attempt has been made to explore the impact of the complex gamut of downward intergenerational transfers on the career and childcare choices of the younger generation in the shrinking labor markets of developed aging economies. The large body of research addressing the choice of childcare and work among mothers typically concentrates on the labor market implications of government induced monetary incentives (see for instance Gronau, 1973, Heckman, 1974, Blau and Robins, 1988). At the same time, the literature studying the impact of downward intergenerational transfers on the labor supply of young individuals has focused predominantly on consequences of downward monetary gifts such as human capital investment or work disincentives (Becker and Tomes, 1976, Ehrenberg and Sherman, 1987, Wolff, 2006).

To the best of our knowledge, the only two microeconomic studies that address the impact of intergenerational solidarity on the choice between motherhood and work explore the link between co-residence and the labor supply of young women (Ogawa and Ermisch, 1996, Sasaki, 2002). Both studies find a positive impact of intergenerational co-residence on the labor supply of young female participants in the intergenerational exchange and this result is interpreted as indicative of a high correlation of co-residence

[1] See for instance the special issue of the Journal of Labor Economics (1985).

and downward transfers, and hence a positive effect of the latter on the work effort of the recipient.

This leaves out of focus not only the potentially important implications of intergenerational solidarity in both co-residing and non-co-residing households, but also the qualitatively different implications of the receipts of monetary and time transfers. There is strong evidence that while co-residence in countries such as those of Western Europe and the United States is decreasingly frequent, time services (especially in the form of grandchild care) are non-decreasing and indeed on the rise (Tobio, 2001, Leira et alii, 2005). From the point of view of economic performance, different types of downward transfers may have different implications. Macro-theoretical studies suggest that while time transfers increase the labor force participation of young people, monetary transfers decrease their work effort (Cardia and Ng, 2003).

We provide further insight into the subject with the use of a simple theoretical model linking informal child care and monetary transfers provided by a benevolent parent to the time that a transfer-receiving child devotes to childcare, labor supply and leisure. We show that grandchild care has a positive effect on the labor supply of young mothers. We then test this hypothesis empirically, using data from10 different European countries. For Europe as a whole, we find a strong positive effect of grandchild care on both the labor force participation and labor market involvement decision of the mother, but no impact of monetary transfers on either of these decisions. Both recipients and donors with better endowments are more likely to participate in a monetary transaction, while mothers with lower level of human capital are more likely to provide time transfers to their better endowed daughters.

The remainder of the paper is organized as follows. In Section 2, we present a model of transfers where an altruistic parent provides time and monetary resources to the child and the child decides how much time to devote to labor supply, childcare and leisure. We also discuss the implications of relaxing the altruism assumption at the end of this section. The hypotheses related to the relationship between grandchild care, monetary transfers and labor supply are tested using the European SHARE data set described in Section 3. The econometric results are discussed in Section 4 and Section 5 concludes.

2. A model of labor supply and private transfers of time and money

We base our analysis on a simple theoretical model of private transfers, where parents help their children by providing grandchild care and/or financial gifts. To understand the link between the receipt of parental transfers and the child's decision to undertake paid employment, we assume that the child's labor supply is endogenous.

There are two main actors in the model: the parent (say a mother) and the adult child (say a daughter) who herself has at least one child. The grandchild has no role in our theoretical framework, but we need the presence of three generations in order to understand grandchild care as part of the time allocation process of both the mother and the daughter. In what follows, the parent and the child are denoted by subscripts p and k, respectively[2]. We consider the following two-stage game.

In the first stage, the mother makes a transfer to her daughter in the form of either grandchild care or money. We assume that the parent is altruistic, in that her utility is an increasing function of her child's welfare[3]. Furthermore, we assume that both the mother and the daughter are better off with the increased quality of grandchildren as a form of intergenerational solidarity. In the second stage, conditional on the parental transfer decision, the child decides how to allocate her time between hours of work, childcare activities and leisure. This recursive structure allows us to solve the model through backward induction. We begin by analyzing the daughter's labor supply decision, after which we characterize the optimal pattern of parental transfers.

2.1. The daughter's allocation of time

The daughter maximizes her utility represented by a continuous, twice differentiable and quasi-concave utility function v. This function is increasing in the amount of consumption c_k, leisure l_k and the total time devoted to chidlcare, which we take as a proxy of child quality. The time devoted to childcare is the sum of the daughter's childcare g_k and grandchild care s. The daughter faces the usual two constraints. First, the total amount of time (normalized to one) is devoted to hours of

[2] We assume income pooling at the household level for both the parent and the child, meaning that we neglect complex bargaining issues between spouses for each generation.

work h_k, leisure l_k, and childcare g_k, such that $h_k + l_k + g_k = 1$. Secondly, the sum of labor resources $w_k h_k$, where w_k is the wage rate and h_k are the hours of work, the non-labor resources y_k, and the total amount of monetary transfers T, is equal to the total amount of private consumption of the daughter.

The maximization problem for the daughter is therefore:

$$\max_{c_k, l_k, g_k} v(c_k, l_k, g_k + s)$$
$$s.t. \begin{cases} h_k + l_k + g_k = 1 \\ c_k = w_k h_k + y_k + T \end{cases} \quad (1)$$

or $\max_{l_k, g_k} v(w_k(1 - l_k - g_k) + y_k + T, l_k, g_k + s)$. The corresponding first-order conditions $\partial v / \partial l_k = 0$ and $\partial v / \partial g_k = 0$ lead to:

$$-w_k v_1 + v_2 = 0 \quad (2)$$

$$-w_k v_1 + v_3 = 0 \quad (3)$$

from which it follows that $v_2 = v_3$. The optimal allocation for the daughter is such that the marginal return of one hour spent in leisure activities is equal to the marginal return of one hour spent in childcare. To obtain closed form solutions and to highlight the role of private transfers (of either time or money) on the labor force participation of the daughter, we use a Cobb-Douglas utility function $v = c_k^{\alpha} l_k^{\beta} (g_k + s)^{\gamma}$.

The first-order conditions solve for :

$$l_k = \frac{\beta(w_k + y_k + T) + \beta w_k s}{w_k(\alpha + \beta + \gamma)} \quad (4)$$

$$g_k = \frac{\gamma(w_k + y_k + T) - (\alpha + \beta) w_k s}{w_k(\alpha + \beta + \gamma)} \quad (5)$$

$$h_k = 1 - \frac{(\beta + \gamma)(w_k + y_k + T)}{w_k(\alpha + \beta + \gamma)} + \frac{\alpha s}{\alpha + \beta + \gamma} \quad (6)$$

Using (4), (5) and (6), we can express the leisure time, childcare and market work as functions of the financial transfers and grandchild care, i.e. $l_k = l_k(T, s)$, $g_k = g_k(s, T)$ and $h_k = h_k(s, T)$.

[3] We discuss other theoretical possibilities in section 2.3. For a comprehensive review of the literature on private transfers, see Laferrère and Wolff (2006).

There are several interesting characteristics of these expressions. First, grandchild care has a positive effect on the labor supply and the amount of leisure of the daughter. At the same time, grandchild care reduces the time devoted by the daughter to childcare. In other words, the receipt of grandchild care shifts the daughter's time allocation from childcare to market work and leisure. Secondly, monetary transfers have a negative (income) effect on the labor market involvement of the daughter. Note that we do not account for public day care services. If such services were available, the monetary transfers could help women cover the cost of day care and join the labor force if their salary is higher than the cost of day care[4].

2.2. The parental allocation of resources

We now turn to the parental problem. As indicated earlier, the parental utility function u is increasing in the child's welfare (of which grandchild quality is an argument) as well as her own private consumption c_p and leisure l_p. This means that both the mother and the daughter are better off with the increased quality of grandchildren as a form of intergenerational solidarity. As usual, u is continuous, twice differentiable, and quasi-concave. In addition, the mother faces the following two constraints. On the one hand, she allocates her time between labor supply h_p, leisure time l_p and grandchild care s, such that $h_p + l_p + s = 1$. On the other hand, her resources $w_p h_p + y_p$ net of the financial transfer T are devoted to private consumption c_p.

The parental maximization problem is therefore:

$$\max_{c_p, l_p, s, T} u(c_p, l_p, v(c_k, l_k, g_k + s))$$
$$s.t. \begin{cases} h_p + l_p + s = 1, \quad c_p = w_p h_p + y_p - T \\ h_k + l_k + g_k = 1, \quad c_k = w_k h_k + y_k + T \\ l_k = l_k(s,T), \quad g_k = g_k(s,T), \quad h_k = h_k(s,T) \end{cases} \tag{7}$$

[4] The inability of providers of monetary as opposed to in-kind transfers to have full control over the choices made by the recipient makes the theoretical modelling of this possibility difficult (Pollak, 1988). Furthermore, for the purposes of our empirical analysis, we have no information on the specific use a monetary transfer. We do however control for differences in the availability of formal care by including country variables in our regressions and hence explore the impact of both time and monetary transfers, conditional on exogenously given institutionalized childcare resources.

which can be rewritten as :

$$\max_{l_p,s,T} u(w_p(1-l_p-s)+y_p-T, l_p, v(w_k(1-l_k(s,T)-g_k(s,T))+Y_k+T, l_k(s,T), g_k(s,T)+s)$$

From the corresponding first-order conditions $\partial u/\partial l_p = 0$, $\partial u/\partial s = 0$ and $\partial u/\partial T = 0$, we obtain the following expressions:

$$-w_p u_1 + u_2 = 0 \tag{8}$$

$$-w_p u_1 + u_3(-w_k l_{k1} v_1 - w_k g_{k1} v_1 + l_{k1} v_2 + g_{k1} v_3 + v_3) = 0 \tag{9}$$

$$-u_1 + u_3(-w_k l_{k2} v_1 - w_k g_{k2} v_1 + v_1 + l_{k2} v_2 + g_{k2} v_3) = 0 \tag{10}$$

The interpretation of (8) is straightforward. The optimal time allocation of the mother is such that her marginal utility of leisure u_2 is equal to the corresponding marginal cost $w_p u_1$. In so far as (9) and (10) are concerned, we know from (2) and (3) that $w_k v_1 = v_2$ and $w_k v_1 = v_3$. Hence, the first-order conditions for grandchild care and the financial transfers can be simplified as follows:

$$-w_p u_1 + u_3 v_3 = 0 \tag{11}$$

$$-u_1 + u_3 v_1 = 0 \tag{12}$$

On the one hand, the marginal cost $w_p u_1$ for the mother of caring for the grandchildren is equal to the marginal altruistic benefit $u_3 v_3$ derived from the increase in the child's level of well-being. On the other hand, the marginal utility lost by transferring money to the child u_1 is equal to the child's marginal utility of receiving money $u_3 v_1$[5]. Combining (11) and (12) gives :

$$v_3 / w_p = v_1 \tag{13}$$

For the child, the marginal benefit of receiving money is equal to the marginal benefit of receiving grandchild care. When this equality does not hold, a better outcome can be reached by reallocating parental resources between grandchild care and cash gifts. Finally, the optimal transfer functions for the parent depend on the monetary resources of the mother and the daughter, i.e. $s = s(w_k, w_k, y_p, y_k)$ and $T = T(w_k, w_p, y_p, y_k)$.

2.3. Discussion and possible extensions

The theoretical prediction that is of greatest interest to us is the positive impact of grandchild care on the daughter's labor force participation. This result is obtained in a setting where the daughter chooses between work, childcare and leisure activities and the grandchild's well-being is a public good that affects the utility functions of both the daughter and the mother. Our model relies on the restrictive assumption of one-sided altruism, where the transfer decisions are made only by the mother. The daughter can neither influence them nor reject them; she simply takes the grandchild care and financial transfers as given. In other words, the two transfers are exogenous to the child.

In keeping with the existing literature on transfer motivations (Laferrère and Wolff, 2006), it could well be argued that a strategic interaction between the daughter and the mother would be more relevant in our case. One could imagine a situation where not only the mother attempts to influence the daughter's labor supply by providing grandchild care services, but also the daughter attempts to extract transfers from her mother. Our model is just a special case of this more general framework. We have a Stackelberg equilibrium solution where the mother acts as a leader and the transfer is taken as given by the daughter, while in the more general Nash equilibrium situation both the mother would be affected by the daughter's labor supply and the daughter would be affected by the time and cash transfers provided by the mother.

Dustmann et alii (2009) develop one such theoretical model where the labor supply of the child and the (cash) transfers from the parents are jointly determined. If applied to our context, this theoretical setting would lead to the following predictions. On the one hand, there would still be a positive relationship between grandchild care and the labor force participation of the daughter. On the other hand, there would be an additional effect of the daughter's labor force participation on the parental transfers. The empirical relevance of this latter prediction is a priori unclear. It turns out to be insignificant in the empirical analysis of Dustmann et alii (2009) based on British teenagers.

Instead of assuming altruism between the mother and the daughter, one could try to explain the provision of parental transfers with the use of an exchange model. Static

[5] Interestingly, this standard first-order condition which links the parent's and child's marginal utility of consumption also holds in the basic altruistic model (Laferrère and Wolff, 2006).

exchange behavior does not seem very plausible in our case. Given that upstream transfers in the form of money are very infrequent in our context, we believe that exchange motivated grandchild care supply, whereby the donor provides a service in exchange for money as in Cox (1987), is very unlikely.

Hence, the more plausible framework would be a dynamic one, whereby the provision of current period downward transfers of time and money on the part of the parent is stimulated by an exchange motive for repayment in terms of future supply of informal care to the parent. While we cannot rule out this possibility, it would be impossible for us to test the related hypothesis with the cross-sectional data available to us. At the same time, such delayed exchange would have no influence on the expected positive impact of grandchild care on the labor supply of the recipients, which is the main focus of our research.

Another shortcoming of our model is the presence of only one adult daughter. Once again, accounting for multiple adult children would not affect our theoretical predictions on the positive relationship between transfers and labor supply decisions. It would only provide additional insights into the intra-household allocation of resources, which have already been discussed elsewhere (Dimova and Wolff, 2008). Specifically, under the assumption of altruistic parental behavior, poorer daughters would receive more cash gifts than their siblings. At the same time, there is no clear prediction vis-a vis the effect of grandchild care receipts.

Given that higher labour market potential (measured by higher wages which are a positive function of high levels of human capital, e.g. education and experience) increases the labour supply incentives of the child, under the assumption of altruism one would expect a positive association between grandchild care and better labour market opportunities of the recipient. The predictions are ambiguous under the exchange motive since the receipt of such services may be either positively or negatively correlated with the child's wage.

3. Data and descriptive statistics

3.1. The Share data

To estimate the relationship between downward transfers and labor participation, we use data from the first release of the SHARE data base. This data base contains detailed information on the financial, human capital, family and health status of people of more than 50 years of age for 10 different European countries[6]. Clearly, the transfer providing parent is the primary respondent to the SHARE questionnaire.

However, aside from detailed information on that primary respondent, the data base also contains some information on up to four randomly selected respondent's children. This latter information includes not only human capital characteristics, but also number of children, age of the youngest and eldest child, and labor force participation. Although information on the actual number of hours of work supplied by the child is missing, we are able to distinguish between different levels of labor force involvement, such as full time work, part time work and no work, which provides sufficient grounds for analyzing the impact of transfers on the degree of labor market involvement of the recipient.

Our data set has several interesting features related to intergenerational transfers. To begin with, when the data set was compiled, only one member of each household gave response to questions related to the provision of grandchild care and cash gifts and the respective response was repeated in the column related to the spouse of that respondent. The data compiling methodology is hence consistent with the assumption of pooling of resources within the households. Secondly, while we do have information on the characteristics of both biological and non-biological children of the respondents, information on the characteristics of sons and daughters in-law is absent.

The literature gives us little guideline on how to overcome this shortcoming of the data. While there are several studies on both upward and downward financial transfers (Arrondel and Masson, 2006, Laferrère and Wolff, 2006), as well as upward services in the form of informal care for disabled elderly parents (Ettner, 1995, Pezzin and Schone, 1999), economic studies on grandchild care are virtually absent. However, the bulk of the sociological literature indicates that not only grandmothers, as opposed to grandfathers, are the primary suppliers of grandchild care but also grandchild care supply is more likely

[6] For further information and download of the data, see the following url http:\\www.share-project.org. The countries included in the first release of SHARE (2004) are Austria, Germany, Netherlands, Sweden, Spain, Italy, Denmark, France, Greece and Switzerland.

to affect the career prospects of the grandchild's mother rather than the father (Tobio, 2001). Moreover, sociological evidence indicates that it is the maternal grandmother who tends to be the primary supplier of grandchild care in Europe (Tobio, 2001, Herlyn, 2001, Dench and Ogg, 2001, 2002).

Hence, we overcome the limitations of our data by restricting our sample to mothers and their adult daughters who have at least one child. We further restrict our sample to the relevant cases of daughters in working age and grandchildren young enough to need care. Given the evidence of highest amount of grandchild care supply being provided to children younger than 10 years of age, we treat this age as our upper bound (Tobio, 2001). Our final sample contains 2317 observations.

Let us now describe our main variables of interest. Our monetary transfer variable takes the value of one if, during the reference period, the respondent has provided a monetary transfer of 250 or more euros to any of her children. We can also distinguish between infrequent grandchild care (grandchild care provided on less than a weekly basis), frequent grandchild care (care provided on a daily or weekly basis) and no grandchild care during the same reference period. Experimentation with the data indicated that only frequent grandchild care has significant influence on the labor supply of the recipient. Hence, we define a grandchild care variable taking the value of one if the donor provides grandchild care on a daily or weekly basis.

We define two different dependent variables for our labor supply equation: (i) a variable taking the value of one if the transfer recipient provides any labor supply and 0 otherwise, and (ii) a variable taking the value of zero if the recipient does not participate in the labor market, a value of one if she participates on a part time basis, and a value of two if she works full time.

According to the theoretical framework, the main explanatory variables should be the income levels and the wage rates of both the donor and the recipient. The data set contains continuous variables of the total current and asset income of the donor's household and we use these variables as proxies for the parent's income. Unfortunately, we do not have information on the income of the recipient. We assume that it is highly correlated with her human capital and household level characteristics such as age, education, marital status, number of children and age of the youngest child. We therefore

include these variables directly into the transfer and labor supply equations. Our "further education" variable is comparable across the different countries and takes a value of one if the recipient of transfers has tertiary education.

One of the major shortcoming of the data is the lack of information on wages. However, as emphasized by Ettner (1996), empirical construction of wage rates for non-workers involves issues of identification. We therefore follow the empirical literature in including factors influencing the wage (such as age, education and family status) directly in our equations as a proxy for the potential wage rate[7].

3.2. Descriptive statistics

Table 1 highlights the descriptive statistics for four different combinations of intergenerational transfers: (i) neither monetary transfer nor grandchild care, (ii) monetary transfer and no grandchild care, (iii) grandchild care and no monetary transfer, and (iv) monetary transfer and grandchild care. While the age of the recipient of transfers does not vary significantly across the categories, we do observe that better educated recipients are more likely to receive a monetary rather than a time transfer from wealthier and better educated parents[8].

Insert Table 1 about here

Expectedly, our statistics also indicate that the acts of not donating and not receiving any transfers are increasing functions in the number of children of the donor and the recipient and the age of the grandchild and a decreasing function of the good health condition of the provider of transfers.

Table 2 highlights the characteristics of the recipients of transfers by employment status, namely full time employment, part time employment and not working. Expectedly, better educated and more experienced mothers are more likely to work, while low level of education has a strong influence on not working. At the same time, the

[7] While our data set does not provide a health variable for the daughter, we include a health variable of the mother in the transfer equations. The rationale for this is that health may be a larger determinant of economic outcomes for the mother, given her age, and may therefore be an important proxy for opportunity costs in her decision to provide transfers.

[8] The mean of further education exceeds 0.75-0.80 in the case of monetary receipt whether simultaneously with a time transfer or without a time transfer, the mean of further education ranges around 0.60 among mothers not receiving monetary transfers. In addition, we find higher means of the current income variables among providers of monetary, as opposed to providers of time transfers.

degree of labor market involvement (full-time versus part time) is a negative function of the number of young children and a positive function of the age of the daughter. Married mothers are slightly more likely to not work than to work, indicating at least a weak impact of double earnings on labor force participation among women with children. Finally, the provision of frequent grandchild care for our sample as a whole appears to stimulate the labor force participation of the recipient, while monetary transfers tend to discourage full time labor force involvement.

Insert Table 2 about here

Overall, our preliminary descriptive analysis is consistent with the prediction of our theoretical model. We do observe for the sample as a whole that time transfers encourage the labor force participation of the recipient, while monetary transfers discourage it. The rest of our descriptive analysis is also in conformity with expectations. Higher degree of human capital of the mother is associated with both a higher level of labor market participation and higher probability of receipt of monetary as opposed to time transfers. At the same time, donors with better human capital characteristics are more likely to donate monetary as opposed to time transfers. Finally, higher level of family involvement, captured by larger number of children and lower age of the youngest child, discourages not only labor force participation, but also the receipt and donation of transfers.

As intergenerational relations do not exist in a vacuum, but are conditioned on an institutional framework, within which they develop, it is worthwhile devoting some attention to the possible cross-country differences in transfers and labor supply. As indicated earlier, we distinguish among three different categories of grandchild care: (i) regular care on a daily or weekly basis, (ii) irregular care of less than weekly basis and (iii) no grandchild care. Figure 1 highlights the cross-national distribution of the different types of grandchild care. The most striking observation is the significant difference in time transfers across Nordic, South European and other continental European countries.

Insert Figure 1 about here

South European countries such as Spain, Italy and Greece, are marked by the highest incidence of regular grandchild care, with Greece experiencing the highest incidence of more than 50%. Interestingly, these are also the countries experiencing the

highest incidence of no grandchild care, with the highest incidence of no grandchild care occurring for instance among approximately 50% of the Spanish grandmothers. This pattern is consistent with the lowest among the continental European countries level of generosity of formal maternity and childcare benefits in combination with low level of flexibility of the South European labor markets (Gauthier, 2002, Leira et alii, 2005). These institutional constraints make it virtually impossible for young mothers in these countries to pursue a career unless they receive a high level of informal childcare assistance (Tobio, 2001).

At the other end of the spectrum, Sweden and Denmark account for the lowest incidence of regular grandchild care (about 20% of the cases) and highest incidence of irregular grandchild care (about 50% of the cases in Denmark and 40% of the cases in Sweden). Once again, this observation is consistent with the institutional framework of the labor markets and social security systems in these countries, namely high social security generosity and high level of labor market flexibility (Gauthier, 2002, Leira, 1991).

With some variation, the rest of the countries are characterized by a more balanced distribution of time transfers across regular, irregular care and no care, with Switzerland experiencing the highest incidence of regular care, in fact regular grandchild care similar to that of Italy and Greece, and the Netherlands experiencing the lowest incidence of regular care. The former observation is consistent with the relatively low level of formal maternity and childcare benefits in Switzerland (Gauthier, 2002), while the latter is consistent with the high level of flexibility of the Dutch labor market, allowing for higher availability of part-time employment for young mothers than in any other European country (Gerhard et alii, 2005).

Figure 2 highlights the distribution of monetary transfers across the countries in the sample. While the difference in the provision of these transfers is both of a smaller scale and more similar across institutional settings, we do observe a higher incidence of such transfers in the northern compared to the southern countries in the sample, i.e. the countries characterized by more generous compared to the countries characterized by less generous family policies. As these two sets of countries stand at two extremes in terms of time transfers, this observation perhaps provides some evidence that institutional

characteristics may influence the substitution of different types of transfers by the parents.

Insert Figure 2 about here

Finally, Figure 3 highlights the distribution of labor force participation across full time, part time and no work activities of the daughter. Once again, we observe marked differences across Nordic, Southern and other continental European countries, which are consistent with the time transfer patterns and our expectations based on the institutional frameworks of these countries' labor markets and social security systems.

Insert Figure 3 about here

Not surprisingly, Sweden and Denmark are characterized by the highest level (more than 50%) full time labor market participation and the lowest level (less than 30%) inactivity. An equally high level of full time labor force participation and low level of inactivity is observed in France. By contrast, while experiencing a slightly smaller, but equally significant level of full time labor force participation of approximately 50%, young mothers in Spain, Italy and Greece are also characterized by the highest level of inactivity, approximately 40%.

As indicated earlier, this dichotomy of high level of inactivity and full time employment, but virtually inexistent part-time work, points out one of the highest levels of labor market inflexibility in Europe. On the contrary, women in Germany, Netherlands and Switzerland are characterized by the highest level of part time and the lowest level of full time labor force involvement, but also significant level of inactivity. In other words, we do observe significant differences in both transfers and labor supply across institutional settings and therefore find it essential to control for these differences in our empirical analysis.

4/ Econometric analysis

The solutions to our theoretical model leave us with four reduced form equations: two equations of time and monetary transfers, provided by the mother as a function of the incomes and wage rates of the mother and the daughter, and two equations for the time

allocation of the daughter as a function of the maternal time and monetary transfers[9]. Due to data limitations, we are only able to estimate one of the latter two equations. We proceed in the following way.

First, we describe the results from the base model of labor supply as a function of time and monetary transfers. Next, we check whether the positive effect of grandchild care on the labor participation of the daughter is still valid after we control for unobserved heterogeneity at the household level. Finally, we estimate jointly the determinants of private transfers and labor force participation of the daughter and allow for the possibility that the residuals of the transfer equations are correlated with those of the labor supply equation.

4.1. The relationship between transfers and labor participation

Following the theoretical framework, the child's latent variable related to her propensity to work h_k^* depends on a set of exogenous covariates X_k and on the parental transfers s and T. The econometric counterpart of the labor equation is :

$$h_k^* = X_k\beta_k + \gamma_s s + \gamma_T T + \varepsilon_h \tag{14}$$

where X_k is a set of variables that explain the daughter's decision to work, β_k is the corresponding vector of parameters, and ε_h is a normally distributed error term. The coefficients γ_s and γ_T capture the effect of grandchild care and cash gifts on the labor supply of the daughter.

As there is no information on the number of working hours in the survey, in what follows we focus on the discrete work related decisions of the child. The latent variable h^* is not observed, but we have $h=1$ when the child works ($h^*>0$) and $h=0$ otherwise. Hence, (14) defines a simple Probit model. Furthermore, given our data-based ability to distinguish between full time and part time labor supply, we explore as an additional case the impact of parental transfers on the child's choice between full time work, part time work and no work. The dependent variable h is now $h=0$ if the

[9] Since the amounts of time devoted to work, leisure and childcare by the daughter sum up to the fixed total amount of time available to her, we only need to estimate 2 out of the 3 relationships summarized in equations (4), (5) and (6).

daughter does not work, $h = 1$ if the daughter works part time, and $h = 2$ if the daughter works full time. This defines an ordered Probit model of labor supply.

The estimates from these two regressions are highlighted in Table 3; column one highlights the results from the Probit analysis, while column two highlights the results from the ordered Probit analysis. We observe that the coefficient of the grandchild care variable in the labor force participation equation is positive and significant at the 1% level. After calculating the corresponding marginal effects, we find that the labor force participation probability of the daughter increases by 11.5 percentage points with grandchild care, the predicted probability for the whole sample being 67.3% (calculated at the means of the sample). The coefficient of the monetary variable is negative, but insignificant at any conventional level.

Insert Table 3 about here

Similarly, the coefficient of the grandchild care variable in the ordered Probit equation of labor market involvement is equal to 0.232. It is once again significant at the 1 percent level, while the coefficient of the monetary variable is once again not. In other words, our empirical results indicate that while grandchild care has a positive impact on both the labor force participation of the daughter and on her degree of labor market involvement, monetary transfers have no impact on either of these variables.

The rest of the results on the labor supply of the daughter are consistent with our hypotheses and conventional logic. We find that higher levels of education and experience (proxied by the age variable) have a strong positive impact on both the labor force participation and the degree of labor market involvement of the young mother, while the number of children and their younger ages have negative impact on both these variables. The marital status variable is not significant in either equation at any conventional level. Finally, our cross-country results are consistent with those highlighted in Figure 2, but they are difficult to interpret since they may be picking up either differences in the functioning of the labor markets or differences in the supply of formal childcare[10].

[10] A shortcoming of the data is that we have no information on the daughter's location. For instance, there may be some differences in the supply of childcare services depending on whether the daughter lives in a rural or urban area.

4.2. Unobserved heterogeneity and fixed effect estimates

One of the most useful characteristics of our data is the availability of information of up to 4 children per respondent. We are therefore able to control for unobserved heterogeneity by including a set of family fixed effects. For instance, if there are any family variables like child ability that are unobserved by the econometrician, but affect the labor supply of the child, the grandchild care estimates from the Probit and ordered Probit regressions would be biased.

Instead of estimating a conditional Logit model à la Chamberlain, we estimate fixed effects Probit and ordered Probit models following the techniques recently developed by Greene (2004). When estimating the fixed effects models, we drop from the regression all the covariates that do not vary at the family level, such as the parental characteristics. Hence, our fixed effects results include only the daughter's characteristics. Finally, note that all the groups with no variation in the dependent variable at the family level are bypassed during the estimation process[11].

Insert Table 4 about here

The estimates reported in Table 4 indicate that our main results continue to hold even after controlling for family fixed effects. The coefficient of the grandchild care variable is 0.805 in the labor force participation equation and 0.535 in the labor force involvement equation. Both coefficients are significant at the 5% level. The rest of our fixed effects results are consistent with our baseline findings, except that after controlling for unobserved heterogeneity, we find a negative impact of the marital status variable on both the decision of the daughter to participate in the labor market and on her degree of labor market involvement.

4.3. The determinants of private transfers

As a final step, we focus on the determinants of the parental transfers. Let s^* and T^* be two latent variables indicating the propensity of the parent to provide grandchild care s^* and cash gift T^*, respectively. The transfer equations can be written as :

$$s^* = X_s \beta_s + \varepsilon_s \tag{15}$$

[11] We also exclude the monetary transfer variable from the regression, as there is no sufficient variability of that covariate at the family level to get robust findings.

$$T^* = X_T \beta_T + \varepsilon_T \quad (16)$$

where X_s and X_T are two sets of variables explaining the grandchild care and financial gift outcomes, β_s and β_T are the vectors of associated parameters, and ε_s and ε_T are two normally distributed random errors. The two latent variables s^* and T^* are not observed, but we have information on the observed counterpart of the transfer variables. Due to limitations with the data, we restrict our attention to the discrete transfer decisions of the parent, s and T, respectively. We have $s = 1$ when $s^* > 0$ and $s = 0$ otherwise, and $T = 1$ when $T^* > 0$ and $T = 0$ otherwise.

It is possible that the error terms of these two equations are correlated with the error terms of the equation describing the decision of the daughter to participate in the labor market, so that we take this possibility into account in our estimation[12]. Let ρ_{hs}, ρ_{hT}, ρ_{sT} be the coefficients of correlation between ε_h and ε_s, ε_h and ε_T and ε_s and ε_T. Assuming that the residuals $(\varepsilon_h, \varepsilon_s, \varepsilon_T)$ follow a trivariate normal distribution such that $(\varepsilon_s, \varepsilon_T, \varepsilon_h) \sim N(0,0,0,1,1,1, \rho_{sT}, \rho_{sh}, \rho_{Th})$, equations (14)-(16) define a trivariate Probit model. The model is estimated using the simulated likelihood procedure described in Capellari and Jenkins (2003).

The results, highlighted in Table 5, indicate that while the further education variable of the mother is negative and significant at the 1% level, the education level of the daughter is positive and significant at the same level. This observation is consistent with the sociological literature on intergenerational solidarity, which finds that mothers with lower levels of human capital tend to promote the professional development of their better endowed daughters (see Gerhard et alii, 2005). As expected, the higher age of the grandchild reduces the probability of regular grandchild care supply, while the probability of regular grandchild care increases if the daughter is not married and is younger. Once again, the cross-country patterns are consistent with those observed in Figure 1.

[12] For instance, it is reasonable to expect a positive correlation between the error terms from the labor supply and the grandchild care equations as higher propensity for grandchild care on the part of the parent increases the child's time available for paid work. At the same time, the receipt of informal care may also require a higher taste for family involvement and leisure, implying a negative correlation between the residuals.

Insert Table 5 about here

Unlike time transfers, monetary transfers seem to be driven to a higher extent by the financial needs of the recipient and the financial ability of the donor. There is a strong positive impact of both current earnings and financial assets of the donor on the provision of monetary transfers. Better educated children are once again more likely to receive transfers than less educated children, while transfers are a decreasing function of the number of children of the donor. Finally, the results on the labor force participation of the daughter are consistent with those reported in column 1 of Table 3 and highlight a strong and positive impact of the grandchild care supply on the labor force participation of the daughter and no corresponding impact of monetary transfers. The rest of the results in column 1 are consistent with our previous findings.

5/ Concluding comments

During the past several decades, much of the political economic debate related to the problems of ageing societies concentrated on the fiscal and informal care burden of the elderly population and on the productivity decreasing impact of the latter. Meanwhile, fertility and child related economic research focused almost exclusively on the impact of family related policies on the choices between motherhood and career, typically ignoring the provision of informal care. Based on both stylized facts and sociological evidence, we postulated that this approach to the fertility and ageing related problems of developed economies is overly restrictive and proposed a theoretical model and empirical estimates of the reduced form equations emanating from the model to fill the potentially important gaps in the literature.

Specifically, we consider a simple theoretical model linking informal grandchild care and monetary transfers provided by a benevolent parent to the time devoted by a transfer-receiving child to childcare, labor supply and leisure. The hypothesis that emanates from the model and is of greatest interest to us is the positive effect of grandchild care on the labor supply of young mothers. For Europe as a whole, we find a strong positive effect of grandchild care on both the labor force participation and labor market involvement decision of the mother, but no impact of monetary transfers on either of these decisions. We also find that both recipients and donors with better endowments

are more likely to participate in a monetary transaction, while in the case of time transfers, mothers with lower level of human capital tend to assist the professional development of their better endowed daughters.

A few shortcomings of our research have to be kept in mind when interpreting our results. First, we do not have sufficiently detailed information on the characteristics of the daughters. It would be useful to know the number of hours devoted to labor activities and to child-rearing activities, as well as the wage rate of the daughters that are working. Secondly, there is no way for us to control for the supply of formal childcare services, which is expected to influence the provision of grandchild care. If we had information on the daughter's location, we could use it to control for formal childcare and local labor market conditions. Finally, we perform only a cross-section analysis of the relationship between grandchild care and labor supply. It is therefore difficult to fully understand the motivations of the parental transfers in this static framework, and the use of a long enough panel could be of interest for future research.

Despite the shortcomings of our analysis, the results open a new dimension to the debate related to intergenerational transfers in ageing economies by taking a step away from the productivity deteriorating impact of informal elderly care. Furthermore, these results suggest that factors other than either personal and nuclear family endowments or family institutions may be an important determinant of young women's choices between motherhood and career.

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Table 1. Descriptive statistics of the sample, by type of transfer

Variables	No transfer	Cash gift, no care	No cash gift, care	Cash gift, care	All
Characteristics of the parent					
Age	63.43	61.26	61.75	59.98	62.60
Married	0.624	0.648	0.685	0.656	0.645
Number of children	2.16	1.57	1.65	1.34	1.93
Good health	0.456	0.398	0.436	0.336	0.439
Further education	0.505	0.699	0.402	0.534	0.492
Income (log)	9.95	10.52	9.80	10.46	9.98
Assets (log)	10.44	11.55	11.00	11.24	10.73
Characteristics of the child					
Age	36.29	35.18	34.90	33.76	35.68
Married	0.768	0.699	0.798	0.656	0.765
Number of grandchildren	2.02	2.01	1.80	1.76	1.95
Age of grandchildren	4.93	3.98	4.21	4.12	4.61
Further education	0.675	0.858	0.642	0.748	0.684
Number of observations	1365	176	645	131	2317

Source: Share release 1, 2004.

Table 2: Descriptive statistics by employment status

Variables	No work	Part time	Full time
Characteristics of the child			
Age	34.80	35.99	36.21
Married	0.787	0.746	0.758
Number of grandchildren	2.02	1.98	1.87
Age of grandchildren	4.09	4.97	4.84
Further education	0.557	0.846	0.693
Receipt of transfers			
Monetary transfer	0.126	0.105	0.154
Grandchild care	0.285	0.364	0.359
Number of observations	787	560	970

Source : Share release 1, 2004.

Table 3. Estimates of the role of private transfers on the mother's labor supply

Variables	Labor participation (1)		Labor involvement (2)	
	coef	s.e.	coef	s.e.
Constant	-0.814***	0.216		
Characteristics of the child				
Age	0.026***	0.007	0.026***	0.006
Married	-0.029	0.073	0.001	0.063
Number of grandchildren	-0.164***	0.034	-0.171***	0.030
Age of grandchildren	0.054***	0.011	0.039***	0.009
Further education	0.631***	0.085	0.646***	0.082
Country (ref: Sweden)				
Austria	-0.424***	0.129	-0.526***	0.113
Germany	-0.486***	0.114	-0.700***	0.096
Netherlands	-0.081	0.103	-0.536***	0.082
Spain	-0.205	0.131	0.029	0.128
Italy	-0.106	0.133	0.072	0.125
Greece	-0.039	0.151	0.173	0.148
Denmark	0.156	0.125	0.260**	0.115
France	0.330**	0.135	0.401***	0.125
Switzerland	-0.540***	0.181	-0.802***	0.138
Transfers				
Grandchild care	0.328***	0.063	0.232***	0.054
Monetary transfer	-0.023	0.086	0.085	0.078
Log likelihood	-1362.9		-2339.1	

Source: Share release 1, 2004.

Note: (1) is a Probit model, (2) is an ordered Probit model. Standard errors are clustered at the family level, significance levels being respectively 1% (***), 5% (**) and 10% (*). The sample includes 2317 observations.

Table 4. Fixed effect estimates of the role of grandchild care on the mother's labor supply

Variables	Labor participation		Labor involvement	
	(1)		(2)	
	coef	s.e.	coef	s.e.
Characteristics of the child				
Age	0.041	0.032	0.072***	0.025
Married	-0.839**	0.328	-0.709***	0.225
Number of grandchildren	-0.444***	0.139	-0.400***	0.102
Age of grandchildren	0.138***	0.046	0.093***	0.033
Further education	2.009***	0.464	2.065***	0.329
Transfers				
Grandchild care	0.805**	0.344	0.535**	0.236
Log likelihood	-156.3		-485.0	

Source: Share release 1, 2004.

Note: (1) is a fixed effects Probit model, (2) is a fixed effects ordered Probit model. Significance levels are respectively 1% (***), 5% (**) and 10% (*). The sample includes 2317 observations (1950 families). The number of bypassed groups in the fixed effects estimation is respectively 1069 for the Probit model, and 740 for the ordered Probit model.

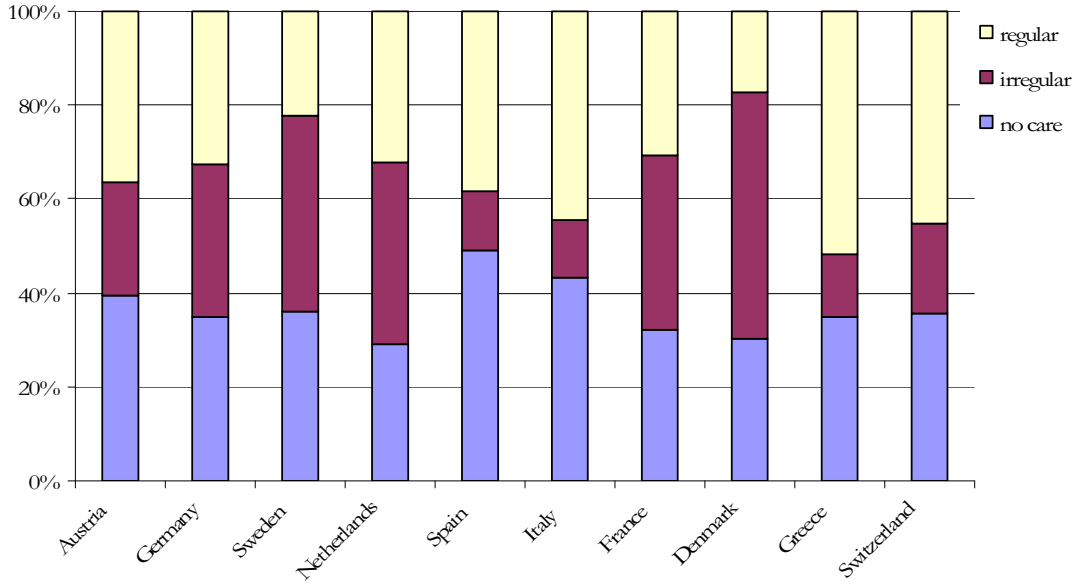
Table 5. Multivariate Probit estimates of labor force participation and transfers

Variables	Labor supply		Grandchild care		Monetary transfer	
	coef	s.e.	coef	s.e.	coef	s.e.
Constant	-0,844***	0,228	0,896***	0,338	-1,921***	0,515
Characteristics of the child						
Age	0,026***	0,007	-0,021**	0,008	-0,011	0,011
Married	-0,027	0,071	-0,143**	0,072	-0,185**	0,084
Number of grandchildren	-0,163***	0,034	-0,038	0,036	0,068	0,043
Age of grandchildren	0,055***	0,011	-0,021**	0,011	-0,017	0,013
Further education	0,625***	0,086	0,284***	0,086	0,212*	0,113
Characteristics of the parent						
Age			-0,009*	0,006	-0,014*	0,007
Married			0,034	0,064	-0,157**	0,080
Number of children			-0,168***	0,023	-0,160***	0,031
Good health			-0,041	0,059	-0,004	0,074
Further education			-0,265***	0,085	0,153	0,099
Income (log)			-0,011	0,020	0,199***	0,038
Assets (log)			0,018*	0,010	0,040***	0,014
Country (ref: Sweden)						
Austria	-0,431***	0,131	0,491***	0,130	-0,192	0,149
Germany	-0,490***	0,113	0,388***	0,116	-0,170	0,129
Netherlands	-0,084	0,105	0,478***	0,108	-0,441***	0,120
Spain	-0,213	0,134	0,668***	0,135	-0,712***	0,206
Italy	-0,119	0,133	0,778***	0,134	-0,058	0,162
Greece	0,325**	0,135	0,325**	0,134	-0,284*	0,163
Denmark	0,158	0,127	-0,091	0,135	-0,280**	0,141
France	-0,056	0,156	0,863***	0,152	0,160	0,180
Switzerland	-0,551***	0,174	0,758***	0,172	-0,296	0,209
Transfers						
Grandchild care	0,373***	0,138				
Monetary transfer	-0,005	0,203				
Coefficient of correlation						
Labor supply	1	-	-0,030	0,077	-0,013	0,106
Grandchild care			1	-	0,129***	0,044
Monetary transfer					1	-
Log likelihood	-3508.0					

Source: Share release 1, 2004.

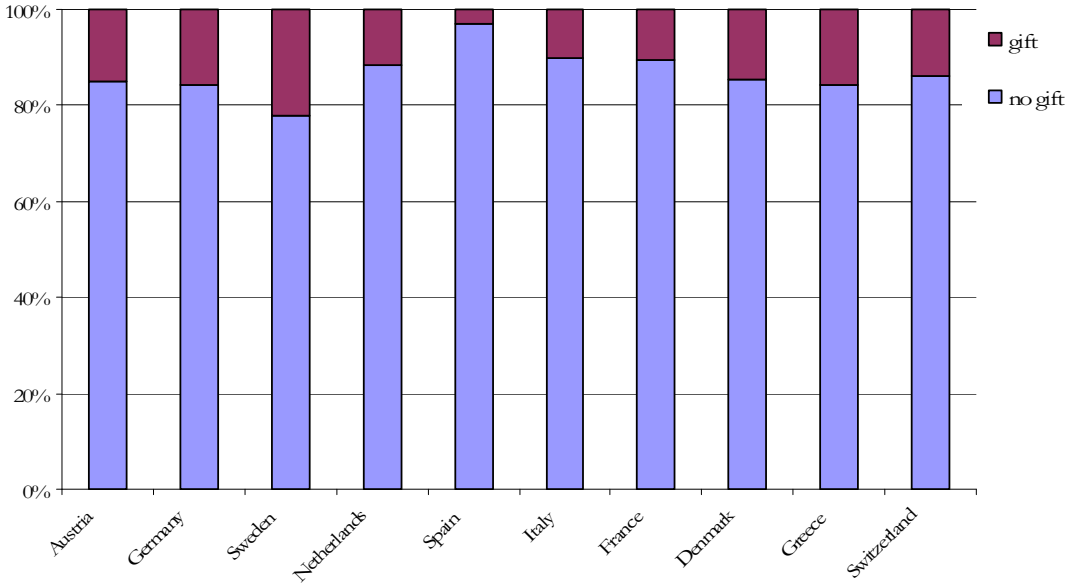
Note: Trivariate Probit model estimated by simulated maximum likelihood. Standard errors are clustered at the family level, significance levels being respectively 1% (***), 5% (**) and 10% (*). The sample includes 2317 observations.

Figure 1. The pattern of grandchildren care in Europe



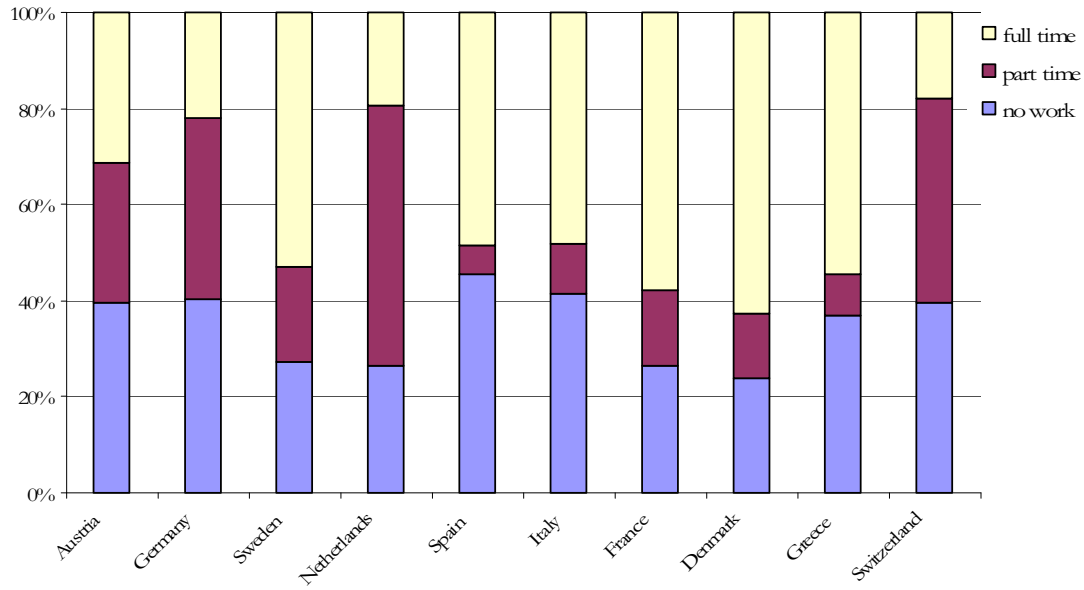
Source : Share release 1, 2004.
Note: Regular care is defined as care provided on daily or weekly basis. The graph is based on the sample of daughters in working age 18-65 who have at least one child of less than 10 years of age, and their elderly mothers.

Figure 2. The pattern of monetary transfers in Europe



Source : Share release 1, 2004.
Note: The graph is based on the sample of daughters in working age who have at least one child of less than 10 years of age, and their elderly mothers.

Figure 3. The pattern of labor market participation in Europe



Source: Share release 1, 2004.
Note: The graph is based on the sample of daughters in working age 18-65 who have at least one child of less than 10 years of age, and their elderly mothers.